Marin Environmental, Inc.

Environmental Consultants and Engineers

Main Office:
7 Island Dock Road
Haddam, CT 06438
Phone: (860) 345-4578
Fax: (860) 345-3854
EMail:
marin@mail.snet.net

In Massachusetts:
118 Main Street
Sturbridge, MA 01566
Phone: (508) 347-5098
Fax: (508) 347-5088
EMail:
marinma@hey.net

In Vermont:
1700 Hegeman Avenue
Colchester, VT 05446
Phone: (802) 655-0011
Fax: (802) 655-6076

In New Hampshire:
63 School Street
P.O. Box 1414
Concord, NH 03302
Phone: (603) 224-8871
Fax: (603) 224-8688

Internet:
www.marinenv.com

INITIAL SITE INVESTIGATION REPORT

JAY PEAK MAINTENANCE GARAGE
Vermont Route 242
Jay, Vermont

22 August 1997

Prepared for:

Jay Peak, Inc.
Vermont Rt. 242
Jay, Vermont 05859

Contact: Jake Webster, Environmental Coordinator
Phone: 802-988-2611

Prepared by:

Marin Environmental, Inc.
1700 Hegeman Avenue
Colchester, Vermont
(802) 655-0011

Contact: Bruce Hamilton

Marin Project #: V96-095
Marin Document #: 96095R03.DOC

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Marin Environmental, Inc. (MARIN) has conducted an initial site investigation at the Jay Peak maintenance garage, located on Vermont Route 242 in Jay, Vermont. The principal investigation findings are summarized as follows:

- Gasoline has been released to the subsurface in the vicinity of two former gasoline and one former diesel underground storage tank (UST) systems at the site. Extensive soil contamination was observed beneath the USTs and pump island when the USTs were removed in November 1996. In some samples, photoionization detector (PID) readings on soils beneath the USTs exceeded 2,000 parts per million (ppm). The area of contaminated soils is estimated at 3,600 square feet.

- The petroleum releases have impacted ground water in the vicinity and downgradient of the removed USTs. Petroleum compounds were detected at levels above the Vermont Groundwater Enforcement Standards (VGESs) and/or Vermont Health Advisory (VHA) in samples collected from six of the seven sampled on-site monitoring wells and all three piezometers installed along the edge of a nearby tributary of the Jay Branch, located about 150 feet southeast of the former USTs ("South brook").

- Free-phase petroleum resembling gasoline was observed in one monitoring well (MW-4), located approximately 50 feet downgradient of the former USTs. The product thickness during the 12 March 1997 sampling event was 1.08 feet.

- The petroleum releases have also impacted the South brook. Gasoline odors, free-product seeps and sheens have been observed along the edge of this stream, and petroleum compounds were detected at levels exceeding the Vermont Water Quality Criteria (WQC) in the mid- and down-gradient stream samples.

- A second Jay Branch tributary (the "North brook"), located to the northeast of the maintenance building, appears to have been impacted by contaminants migrating preferentially through the building's curtain drain system, which discharged directly to this brook. Drain flows have subsequently been redirected to the existing diversion trench and ground-water treatment system.

- No other identified sensitive receptors appear to be threatened. No contamination was detected in the on-site building tap water, whose source is a spring located approximately 2,000 feet west, or upgradient, of the site.

- Soils at the site consist largely of sand and gravel from the surface down to a depth of 8 to 18 feet below ground surface (bgs), underlain in most areas by clay. The base of the sand-and-gravel unit slopes generally east-southeast, at an estimated grade of about 12 percent. During the 12 March 1997 monitoring event, ground water was observed in the sand-and-gravel aquifer at depths of four to sixteen feet bgs, and was flowing generally east-southeast at an average gradient of 11 percent. The saturated thickness of the aquifer during this event is estimated at between 4 and 8 feet. Bedrock has not been encountered at the site.

- Unless corrective action is taken to remediate contamination in the source area, gasoline and diesel contamination will likely continue to leach into ground water, and potentially impact nearby surface waters, for several years.

On the basis of these findings, MARIN makes the following recommendations:

1. Although an existing ground-water treatment system operating at the site is likely to be effective at reducing further contaminant migration into the South brook, MARIN does not believe that this system is capable of remediating the soil, free-phase or ground-water contaminant plumes. More active remediation appears to be warranted, based on the documented impact to the Jay Branch tributaries.
2. A Corrective Action Feasibility Investigation (CAFI) should be completed to evaluate the most appropriate technique to remediate residual petroleum contamination at the site. The CAFI should include an evaluation of treatment technologies such as soil excavation, vapor extraction, air sparging, vacuum-enhanced recovery, or a combination of various methods. The site hydrogeology suggests that soil-vapor extraction, air sparging and/or vacuum-enhanced recovery may be appropriate remedial techniques.
3. As part of the CAFI, additional testing on air and water permeability of the on-site soils should be performed. The additional tests should include slug injection or withdrawal tests, and pilot studies employing both low- and high-vacuum extraction to one or more wells, and air injection into a pilot sparge point. The potential for modifying the existing ground-water recovery system to create a dual-pump vacuum-enhanced recovery system should also be investigated. Results of these studies should be used to develop a Corrective Action Plan for the site.
4. Ground-water and surface-water quality at the site should be monitored quarterly, with all samples analyzed for BTEX compounds and MTBE by EPA Method 8020. Surface-water sampling should include both of the adjacent streams.
5. Water level and free-product thickness in monitoring well MW-4 should be measured once every two weeks. If present, free-product should be removed by hand bailing and placed in a temporary storage drum.
6. The quarterly remedial progress reports for the site should be expanded to incorporate time-series graphs for water-quality analytical results from each location and figures showing ground-water flow direction and contaminant distribution.

1.0 INTRODUCTION

This report details the results of an initial site investigation conducted at the Jay Peak maintenance garage, located on Vermont Route 242 in the town of Jay, Vermont (Figure 1). This report has been prepared by the Ground Water of Vermont division of Marin Environmental, Inc. (MARIN) for Jay Peak, Inc., the property owner. The site investigation was initiated with Vermont Department of Environmental Conservation (VT DEC) approval following the discovery of subsurface petroleum contamination and discharge of free-phase petroleum to a nearby stream during the removal of two in-service and one out-of-service single-walled underground storage tanks (USTs) on 4 November 1996.

1.1 Site Location and Physical Setting

The site is located along a gravel access road to Jay Peak Ski Area, approximately 200 feet west of Vermont Route 242, and approximately three miles west of the village of Jay, Vermont (Figure 1, Site Location Map). The site is occupied by two maintenance buildings — a two-bay fleet automotive and ski equipment service area/supply warehouse and adjacent steel utility structure (Figure 2, Site Map).

The ground surface around the buildings is generally flat and has an average elevation of about 1978 feet above mean sea level. A steep embankment along the southern part of the site drops approximately thirty feet to an unnamed Jay Branch tributary, which flows eastward through a culvert beneath the Jay Peak access road. This tributary will be referred to as the "South brook." A smaller Jay Branch tributary, which flows eastward to the northeast of the on-site maintenance building and will be referred to as the "North brook," merges with the South brook approximately 300 feet east of the maintenance building.

Surrounding areas to the west are occupied by Jay Peak's Stateside operations, which consist of ski lift lines, food services and associated parking. Areas to the southeast of the maintenance garage are occupied by additional equipment storage and service structures. The direction of ground-water flow in the area is presumed to follow the topographic relief toward the southeast.

The site and all nearby buildings are served by individual on-site drinking-water and wastewater disposal systems. The water supply for the site is a spring located approximately 2,000 feet west of the site, in the probable upgradient direction. The site's on-site septic system is located approximately 20 feet east of the eastern edge of the garage.

The nearest off-site supply well, the Stony Path Condominium development, is located approximately 1,200 feet north-northeast of the garage, in the presumed cross-gradient direction. The Jay Peak Village Phase I water supply (WSID#20464) is approximately 2,000 feet northwest (presumably upgradient of the site). Bedrock wells serving the Snow Line Hotel and a private residence are located along Route 242 approximately 2,600 feet east of the garage, in the presumed downgradient direction.

Native surficial materials in the vicinity of the site are mapped as glacial till (Stewart and MacClintock, 1970). Bedrock in the area is mapped as Underhill formation, Jay Peak

member consisting of pale, silver-green, quartz-sericite-chlorite-albite schist, locally quartzitic (Doll, 1961).

1.2 Site History

On 4 November 1996, two in-service and one out-of-service single-walled steel petroleum USTs were removed from the Jay Peak maintenance garage. The removed USTs consisted of one 2,000-gallon in-service, registered, regular-unleaded gasoline UST, 12 years old; a 2,000-gallon out-of-service, registered, UST (formerly containing leaded gasoline), 27 years old; and a 4,000-gallon in-service, registered, diesel UST, 27 years old.

The in-service gasoline UST had failed a TracerTight tightness test conducted on 20 October 1996. The diesel UST and piping systems for both in-service USTs had passed the tightness test. The out-of-service UST was not tested.

The USTs were located in a graveled service and parking area approximately eighty feet southwest of the front of the garage. The island and associated fuel dispensers for the tanks were located approximately 10 feet north of the UST tank location. Vent and fill lines for all the tanks were located immediately south of the tank cluster and extended 4 - 8 feet above grade. Leak-detection monitoring wells were observed at each end of the pump island and adjacent to the southeast corner of UST cluster.

During closure operations, evidence of gasoline releases was observed along the bottom of an end seam of the in-service gasoline UST, at the fitting connecting this UST's suction line to the top of the tank, and beneath the pump island. The other removed USTs and associated piping systems appeared to be in fair condition at the time of removal. PID readings in the excavation ranged from 1.2 ppm to over 2,000 ppm, with the highest readings beneath the in-service gasoline UST and the lowest readings near the diesel UST. Associated piping for all the USTs was found to be in fair condition, with significant rust, but no apparent holes or obviously loose fittings.

Ground water was encountered in the excavations at a depth of 4-5 feet bgs. No petroleum sheens or free product were observed on the ground-water surface in the UST excavations, but sheens, odors and free-phase petroleum product resembling gasoline were observed on ground water in a trench excavated approximately 80 feet east-southeast of the USTs along the top of an embankment above the South brook, in seeps along this stream, and in the outfall of a drainage pipe that drained from the former UST area to the stream. Sorbent pads and booms were installed along the perimeter of the product seeps in the stream. Approximately 50 cubic yards of soil excavated for the diversion trench and tank pit were polyencapsulated at an on-site location south of the garage.

Under the direction of the on-site VT DEC officials, two additional test pits and trenches were excavated along the top of the embankment — approximately 60 and 90 feet southeast and east-southeast of the UST excavation, respectively. A ground-water remediation system was installed on an emergency-response basis during the period from 4 - 7 November 1996. The initial remediation system consisted of an interception trench, a culvert recovery well, and a product/water pumping and reinjection system. The reinjection system became problematic, as the surficial aquifer proved incapable of accepting a sufficient quantity of

water, so MARIN obtained VT DEC permission to treat the extracted water with activated carbon and discharge it to the top of an embankment approximately thirty feet above the South brook. This system operates under 1272 Discharge Order No. 7-9607, issued by the Vermont Department of Environmental Conservation (VT DEC).

MARIN initiated an initial site investigation after receiving approval on 5 November 1996 from Jay Peak Inc. officials and the VT DEC to investigate the degree and extent of contamination under the Expressway Notification procedure.

In April 1997, a low-profile air-stripper unit was installed to supplement the existing ground-water remediation system.

On 23 May 1997, a MARIN hydrogeologist noticed a PVC pipe discharging water to the North brook. Discharge flows exhibited a gasoline-like odor. The pipe outlet had not been observed previously, apparently having been buried by snow during previous inspections. This drain was the outfall of a curtain drain around the maintenance building, and appeared to be acting as a preferential migration pathway for contaminated ground water originating near the former gasoline tanks. The MARIN hydrogeologist collected a water sample from the discharge point, and submitted it for laboratory analysis of gasoline compounds by EPA Method 8020.

On 2 June 1997, upon receipt of analytical results confirming the presence of gasoline compounds in the discharge water, MARIN notified John Schmeltzer of the VT DEC of the discharge. Mr. Schmeltzer authorized the diversion of the curtain-drain effluent to the ground-water recovery trench located south of the building, to be captured and treated by the existing ground-water recovery system.

On 4 and 5 June 1997, Jay Peak personnel redirected the discharge pipe to the recovery trench, under the supervision of MARIN personnel. The existing line was left in place, but was shut off with a valve, in the event that the diversion should not prove necessary at a later date. At the conclusion of this operation, no discharge was observed at the original pipe outfall.

1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these purposes, MARIN has:

- Reviewed existing historical site data.

- Supervised the installation of eight monitoring wells and three piezometers, and determined the extent of contamination, and the local ground-water flow direction and gradient.
- Screened subsurface soils from the soil borings for the possible presence of volatile organic compounds (VOCs) using a photoionization detector (PID).
- Collected and submitted ground-water samples from the on-site monitoring wells and piezometers for laboratory analysis of volatile petroleum compounds by EPA Method 8020.
- Collected and submitted surface-water samples from three locations along the South brook and from the building curtain-drain outfall, for laboratory analysis of volatile petroleum compounds by EPA Method 8020.
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors.
- Evaluated the need for treatment and/or a long-term monitoring plan for the site.
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Soil Boring / Monitoring Well and Piezometer Installation

On 10 and 11 February 1997, MARIN supervised the installation of five monitoring wells (MW-1, MW-2, MW-3, MW-4 and MW-5). The monitoring wells were installed by Adams Engineering of Underhill, Vermont using vibratory drilling techniques to both advance the borings and emplace the wells. The vibratory drilling rig was not able to penetrate through large cobbles encountered at several locations, so three additional monitoring wells (MW-6, MW-7 and MW-8) were installed on 24 February 1997 by Tri-State Drilling and Boring of West Burke, Vermont using hollow-stem-auger (HSA) drilling techniques. The wells were placed in the former tank and pump island areas and in areas presumed to be hydraulically downgradient and cross-gradient from the former USTs as suggested by surrounding surface topography and waterway locations. Approximate monitoring well locations are shown on Figure 2.

The soils encountered in each boring generally consisted of sands and gravels from the surface down to approximately 8-18 foot depth, underlain in most areas by clay. The bottom of the sand-and-gravel unit appears to slope to the east-southeast at a gradient of approximately 12 percent.

At borings advanced using vibratory drilling, continuous soil samples were collected using a five-foot polyethylene-lined core barrel with a 2.375-inch inner diameter. The core barrel, which also served as the drill bit with an outer diameter of 4.0 inches, was simultaneously pushed and vibrated into place to advance the boring. At borings advanced using HSA techniques, soil samples were collected at five-foot intervals using a standard split-spoon barrel.

The soil samples were screened for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID) and logged for lithology by a MARIN engineer. All downhole drilling equipment was decontaminated and the polyethylene core barrel liner changed between borings. The soil-screening results are discussed in Section 2.2 below.

Ground water was encountered in all of the borings, at depths ranging from four to sixteen feet below ground surface (bgs). Monitoring wells were installed in soil borings MW-1, 2, 3, 4 and 5 by vibrating a 1.5-inch diameter PVC well point into the open hole left by the core barrel. A 10 foot section of 0.010-inch slot high-flow screen was placed such that approximately five feet of screen extended above the apparent water table. Solid 1.5-inch diameter PVC riser extended from the top of screen to approximately 0.5 feet below ground surface.

Monitoring wells (MW-6, 7 and 8) were constructed using hollow-stem auger drilling techniques employing two-inch screen and risers. Clean quartz #1 filter sand was placed in any open annulus around the well to at least one foot above the top of the screened interval. A bentonite seal at least one foot thick was installed above the sand pack and the remainder of

the annular space was filled with native material. With the exception of MW-6 (which employed an above-grade well protector), each completed monitoring well was protected by a flush-mounted steel roadbox that was cemented in place. Monitoring-well construction details are included on the boring/well logs in Appendix B. All wells were developed immediately after construction using a peristaltic or air-driven pump. Development water was discharged to the ground surface in the vicinity of each well.

Because the steep slope along the South brook prevented access by a drilling rig, steel piezometers were installed by hand at three locations along the streambank. Piezometer PZ-1 was placed at the toe of the embankment near the culvert outfall. The remaining piezometers were placed at 50-75 foot intervals farther downstream.

2.2 Soil-Screening Results

A MARIN engineer screened soil samples from each boring for the possible presence of volatile organic compounds (VOCs) using a Photovac Model TIP II portable photoionization detector (PID). The PID was calibrated with an isobutylene standard gas to a benzene reference. PID screening results are included in boring logs in Appendix B.

PID readings ranged from 0.3 to 1,926 ppm, with the highest reading obtained at a depth of approximately 13 feet bgs from MW-4, located approximately 50 feet east and topographically downgradient of the former tanks. The PID readings suggest that significant soil contamination above the water table is present at monitoring wells MW-3, MW-4, MW-5, and MW-8. The area of soil contamination is roughly estimated to cover an area approximately sixty feet wide and sixty feet long, comprising approximately 3,600 square feet.

2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in a east-southeasterly direction, controlled by the topographic slope and the slope of the sand-and-gravel aquifer. The average gradient of the ground-water table on 12 March 1997 was about 11 percent. The saturated thickness of the aquifer during this sample event is estimated at between four and eight feet. Water-level measurements and elevation calculations are presented in Table 1. The ground-water contour map (Figure 3) was prepared using this data.

Fluid levels were measured in the eight monitoring wells on 12 March 1997. The depth to water varied from 3.40 feet (MW-5) to 16.82 feet (MW-6) below top-of-casing. Free-phase gasoline was observed in monitoring well MW-4, at a thickness of 1.08 feet. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet.

highly permeable darcian flow with

2.4 Water Sampling and Analysis

On 12 March 1997, water samples were obtained for laboratory analysis from seven of the eight monitoring wells (no sample was collected from MW-4 due to the presence of free-phase gasoline), the recovery well, the three piezometers, and three surface-water locations in the South brook. The building curtain-drain outfall was sampled on 23 May 1997. The analytical results indicate the presence of gasoline-related contamination at all locations except the up-gradient South brook sample. Ground-water, surface and piezometer analytical results are summarized in Table 2. Laboratory report forms are included in Appendix C.

Vermont Groundwater Enforcement Standards (VGESs)[1] or Vermont Health Advisory (VHA) guideline standards were exceeded for one or more gasoline compounds at six of the seven sampled monitoring-well locations and at all three piezometer locations. The highest contaminant concentrations were detected at piezometer PZ-1; 114,550 micrograms per liter (µg/L) total BTEX (gasoline constituents benzene, toluene ethylbenzene and xylene), and 4,450 µg/L MTBE (methyl-tertiary butyl ether, an octane boosting gasoline additive).

The Vermont Water Quality Standard[2] for benzene was exceeded at the mid- and down-gradient South brook sample locations, and at the curtain-drain outfall adjacent to the North brook. The highest surface-water benzene concentration, 8.6 µg/L, was detected in the mid-gradient South brook sample.

Each monitoring well was purged and then sampled using a dedicated bailer and dropline. Purge water was discharged directly to the ground in the vicinity of each well. A trip-blank sample was collected during the sampling event for quality assurance/quality control (QA/QC) purposes. All field procedures were conducted in accordance with MARIN standard protocols.

The ground-water samples were submitted to Endyne, Inc. of Williston, Vermont, where they were analyzed for the possible presence of benzene, toluene, ethylbenzene, xylenes (collectively termed BTEX) and methyl-tertiary butyl ether (MTBE) by EPA Method 8020. Analytical results from the QA/QC sample indicates that adequate QA/QC was maintained during sample collection and analysis. None of the BTEX compounds or MTBE were detected in the trip-blank sample.

---

[1] The State of Vermont has established Vermont Groundwater Enforcement Standards (VGESs) for the BTEX compounds: benzene - 5 µg/L; toluene - 2,420 µg/L; ethylbenzene - 680 µg/L; and xylenes - 400 µg/L. The State has established a Vermont Health Advisory (VHA) guideline standard of 40 µg/L for the gasoline additive MTBE.

[2] The State of Vermont has established Water Quality Criteria (WQC) for the protection of human health in Class B waters for three BTEX compounds: benzene - 1.2 µg/L; toluene - 6,800 µg/L; and ethylbenzene - 3,100 µg/L.

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

3.1 Sensitive Receptor Survey

MARIN conducted a survey to identify sensitive receptors in the vicinity of the site that could potentially be impacted by residual soil and ground-water contamination. The following sensitive receptors were identified in the vicinity of the site:

- South brook - the unnamed Jay Branch tributary located downgradient and immediately south and southeast of the site.
- North brook - the unnamed Jay Branch tributary located north and east of the site.
- The on-site maintenance garage, constructed on a slab-on-grade concrete foundation.
- An off-site spring, located approximately 2,000 feet west of the site, which serves as the water source for the maintenance garage.
- Four off-site bedrock supply wells are located within one-half mile of the site. The Stony Path Condominium development well is located approximately 1,200 feet north-northeast of the garage, in the cross-gradient direction. The Jay Peak Village Phase I water supply well (WSID#20464) is located approximately 2,000 feet to the northwest, upgradient of the site. The Snow Line Hotel well and a well serving a private residence are located approximately 2,600 feet east of the garage, in the downgradient direction, along Vermont Route 242.

3.2 Risk Assessment

MARIN assessed the risks that the residual subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

The findings of our risk assessment indicate that the residual subsurface petroleum contamination at the site has impacted the South and North brooks, but does not appear to pose a significant threat to any other identified sensitive receptors. These findings are summarized below:

- Petroleum compounds have migrated though ground water in the sand-and-gravel aquifer and have impacted the South brook. Vermont Groundwater Enforcement Standards for all of the BTEX compounds were exceeded in a ground-water sample collected from piezometer PZ-1, located at the toe of an embankment bordering the waterway, and benzene was detected at levels above the Vermont Water Quality Criteria (WQC) in the mid-stream and downstream surface water samples. The Vermont Health Advisory for MTBE was exceeded in all piezometer ground-water samples.
- Prior to the redirection of the maintenance-building curtain drain system, petroleum compounds were apparently migrating through this preferential pathway and into the

North brook. Benzene was detected in a curtain-drain sample collected on 23 May 1997 at 6.1 µg/L, exceeding the WQC of 1.2 µg/L.

- Visual inspection and PID screening of the on-site building interior did not indicate an impact from the petroleum release to this receptor — no atypical petroleum odors or seeps were observed and a PID reading of 0.1 ppm was recorded within the building following the cessation of maintenance operations.

- None of the water supplies in the vicinity of the site appear to be threatened. All of the water supplies are located at least 1,000 feet away. Bedrock-aquifer contamination appears unlikely, due to the presence of a clay confining layer beneath the contaminant plume, and the absence of any bedrock wells penetrating this layer within the area of shallow contamination. The spring serving the maintenance building and two of the bedrock wells are located upgradient or cross-gradient from the site. The two wells located in the general downgradient direction are both approximately one-half mile away, and available evidence suggests that the ground-water contaminant plume does not intersect these wells. Contaminant entry to the on-site tap water system by infiltration of contaminated ground water into the water lines is also considered unlikely, as the water line does not pass through any areas of significant contamination, and no contaminants were detected in a building tap-water sample collected in November 1996.

4.0 CONCLUSIONS

On the basis of the investigation results, MARIN has concluded the following:

- Gasoline has been released to the subsurface in the vicinity of two former gasoline and one former diesel underground storage tank (UST) systems at the site. Extensive soil contamination was observed beneath the USTs and pump island when the USTs were removed in November 1996. In some samples, photoionization detector (PID) readings on soils beneath the USTs exceeded 2,000 parts per million (ppm). The area of contaminated soils is estimated at 3,600 square feet.
- The petroleum releases have impacted ground water in the vicinity and downgradient of the removed USTs. Petroleum compounds were detected at levels above the Vermont Groundwater Enforcement Standards (VGESs) and/or Vermont Health Advisory (VHA) in samples collected from six of the seven sampled on-site monitoring wells and all three piezometers installed along the edge of a nearby tributary of the Jay Branch, located about 150 feet southeast of the former USTs ("South brook").
- Free-phase petroleum resembling gasoline was observed in one monitoring well (MW-4), located approximately 50 feet downgradient of the former USTs. The product thickness during the 12 March 1997 sampling event was 1.08 feet.
- The petroleum releases have also impacted the South brook. Gasoline odors, free-product seeps and sheens have been observed along the edge of this stream, and petroleum compounds were detected at levels exceeding the Vermont Water Quality Criteria (WQC) in the mid- and down-gradient stream samples.
- A second Jay Branch tributary (the "North brook"), located to the northeast of the maintenance building, appears to have been impacted by contaminants migrating preferentially through the building's curtain drain system, which discharged directly to this brook. Drain flows have subsequently been redirected to the existing diversion trench and ground-water treatment system.
- No other identified sensitive receptors appear to be threatened. No contamination was detected in the on-site building tap water, whose source is a spring located approximately 2,000 feet west, or upgradient, of the site.
- Soils at the site consist largely of sand and gravel from the surface down to a depth of 8 to 18 feet below ground surface (bgs), underlain in most areas by clay. The base of the sand-and-gravel unit slopes generally east-southeast, at an estimated grade of about 12 percent. During the 12 March 1997 monitoring event, ground water was observed in the sand-and-gravel aquifer at depths of four to sixteen feet bgs, and was flowing generally east-southeast at an average gradient of 11 percent. The saturated thickness of the aquifer during this event is estimated at between 4 and 8 feet. Bedrock has not been encountered at the site.
- Unless corrective action is taken to remediate contamination in the source area, gasoline and diesel contamination will likely continue to leach into ground water, and potentially impact nearby surface waters, for several years.

5.0 RECOMMENDATIONS

On the basis of these findings, MARIN makes the following recommendations:

1. Although an existing ground-water treatment system operating at the site is likely to be effective at reducing further contaminant migration into the South brook, MARIN does not believe that this system is capable of remediating the soil, free-phase or ground-water contaminant plumes. More active remediation appears to be warranted, based on the documented impact to the Jay Branch tributaries.
2. A Corrective Action Feasibility Investigation (CAFI) should be completed to evaluate the most appropriate technique to remediate residual petroleum contamination at the site. The CAFI should include an evaluation of treatment technologies such as soil excavation, vapor extraction, air sparging, vacuum-enhanced recovery, or a combination of various methods. The site hydrogeology suggests that soil-vapor extraction, air sparging and/or vacuum-enhanced recovery may be appropriate remedial techniques.
3. As part of the CAFI, additional testing on air and water permeability of the on-site soils should be performed. The additional tests should include slug injection or withdrawal tests, and pilot studies employing both low- and high-vacuum extraction to one or more wells, and air injection into a pilot sparge point. The potential for modifying the existing ground-water recovery system to create a dual-pump vacuum-enhanced recovery system should also be investigated. Results of these studies should be used to develop a Corrective Action Plan for the site.
4. Ground-water and surface-water quality at the site should be monitored quarterly, with all samples analyzed for BTEX compounds and MTBE by EPA Method 8020. Surface-water sampling should include both of the adjacent streams.
5. Water level and free-product thickness in monitoring well MW-4 should be measured once every two weeks. If present, free-product should be removed by hand bailing and placed in a temporary storage drum.
6. The quarterly remedial progress reports for the site should be expanded to incorporate time-series graphs for water-quality analytical results from each location and figures showing ground-water flow direction and contaminant distribution.

6.0 REFERENCES

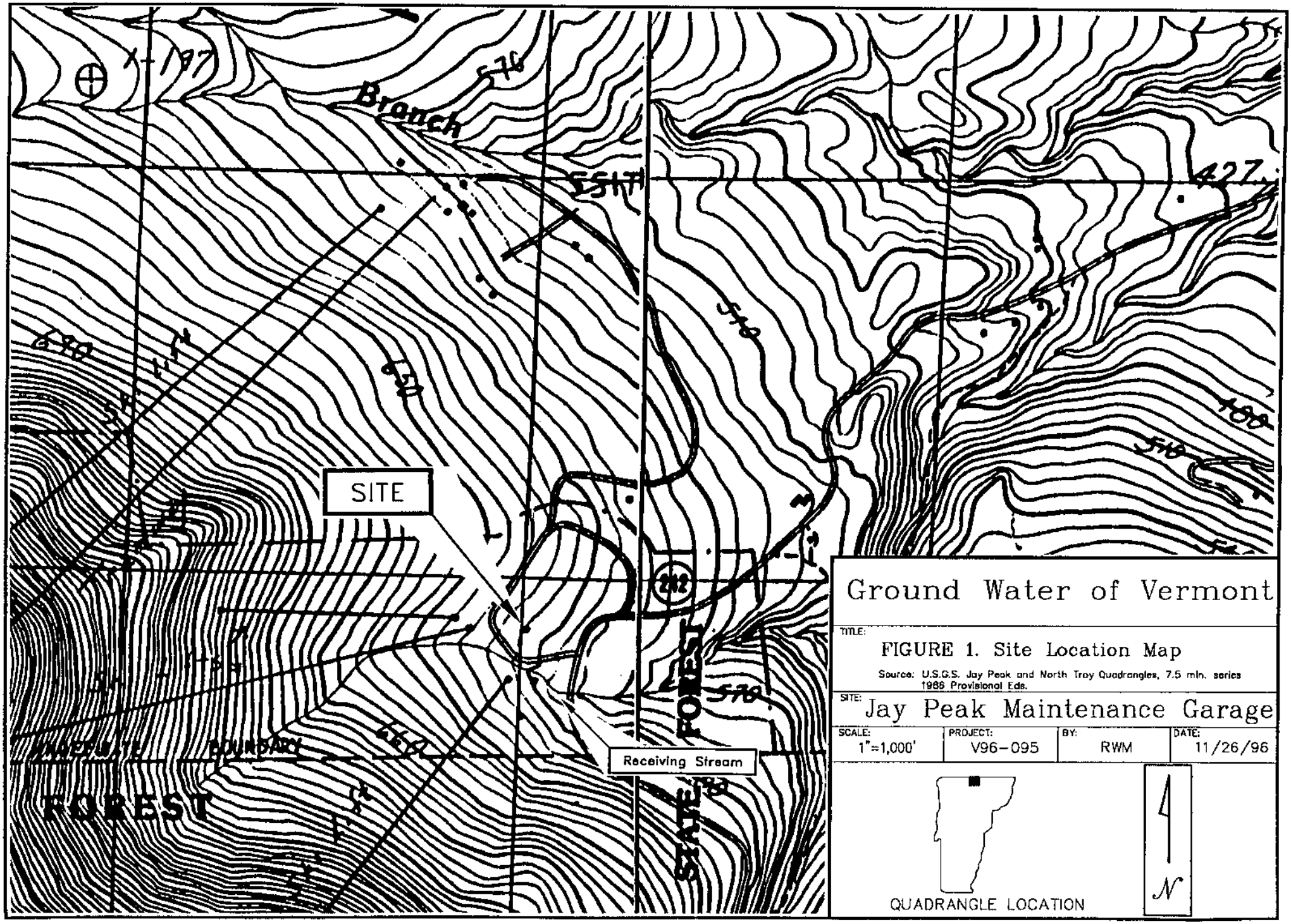
Doll, C.G. and others, 1961. *Geologic Map of Vermont*, Office of the State Geologist.

Stewart, D.P. and MacClintock, P., *1970. Surficial Geologic Map of Vermont*, Office of the State Geologist.

USGS, 1986. Jay Peak Vermont. U.S. Geological Survey. 7.5x15 minute series (topographic). Provisional Edition, 1986.

APPENDIX A

Figures and Tables



Ground Water of Vermont

TITLE:

FIGURE 1. Site Location Map

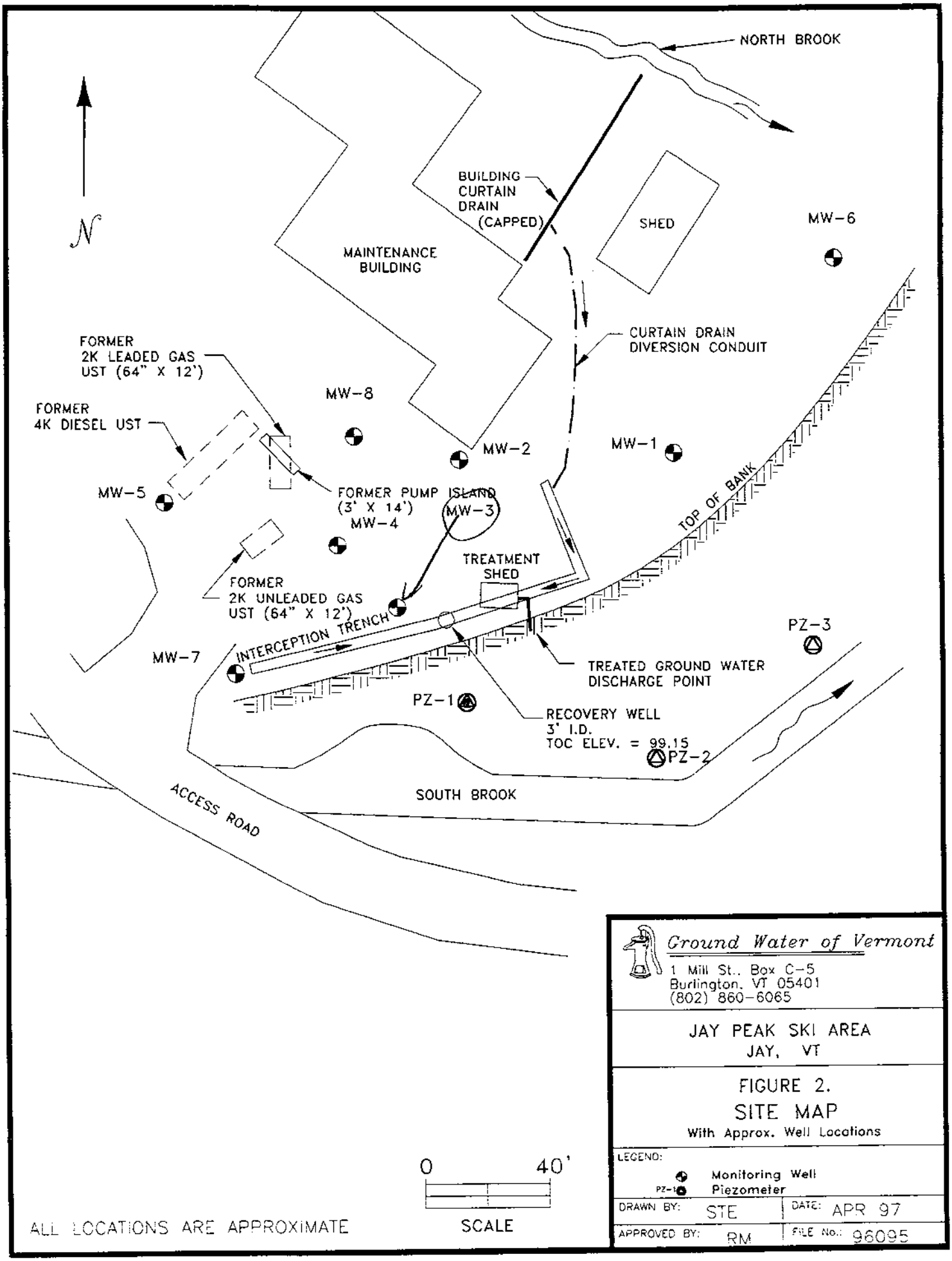
Source: U.S.G.S. Jay Peak and North Troy Quadrangles, 7.5 min. series 1986 Provisional Eds.

SITE: Jay Peak Maintenance Garage

SCALE:	PROJECT:	BY:	DATE:
1"=1,000'	V96-095	RWM	11/26/96

QUADRANGLE LOCATION

N



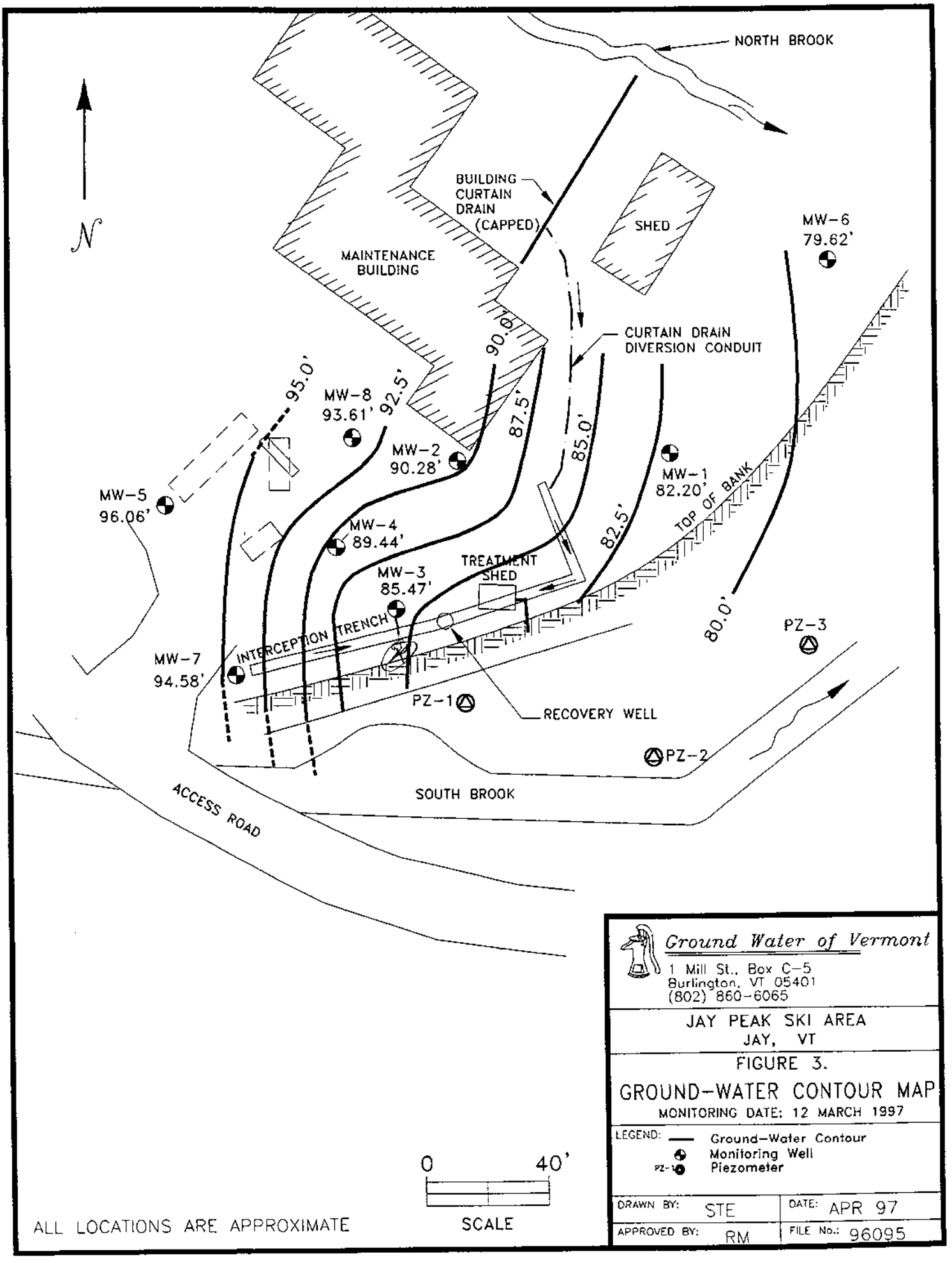
Ground Water of Vermont
1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

JAY PEAK SKI AREA
JAY, VT

FIGURE 2.
SITE MAP
With Approx. Well Locations

LEGEND:
Monitoring Well
PZ-1 Piezometer

DRAWN BY: STE	DATE: APR 97
APPROVED BY: RM	FILE No.: 96095



Ground Water of Vermont
1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

JAY PEAK SKI AREA
JAY, VT

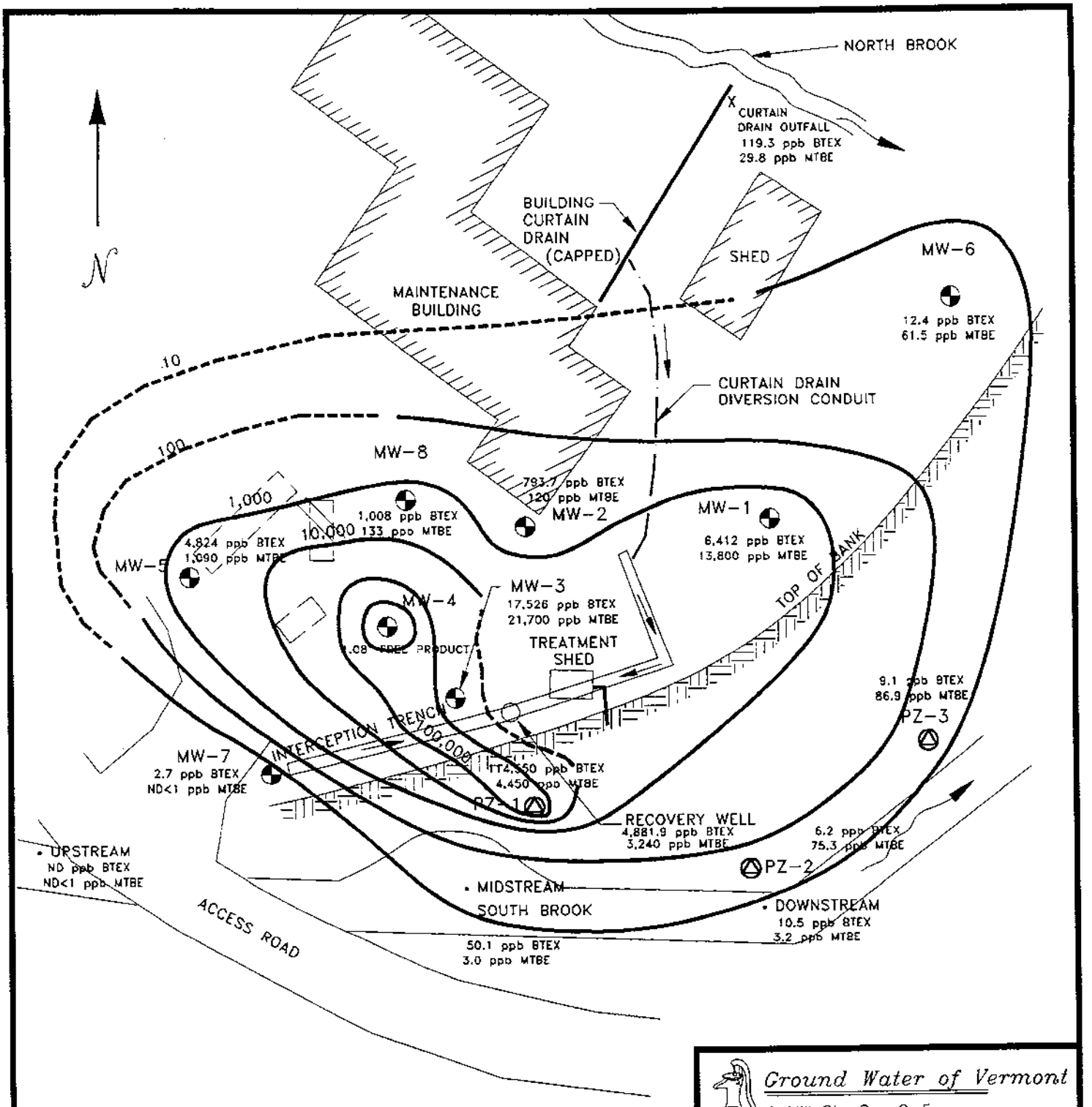
FIGURE 3.

GROUND-WATER CONTOUR MAP

MONITORING DATE: 12 MARCH 1997

LEGEND: Ground-Water Contour
Monitoring Well
PZ-1 Piezometer

DRAWN BY: STE	DATE: APR 97
APPROVED BY: RM	FILE No.: 96095



Ground Water of Vermont
1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

JAY PEAK SKI AREA
JAY, VT

FIGURE 4.

CONTAMINANT DISTRIBUTION MAP

MONITORING DATE: 12 MARCH 1997

LEGEND:
- ND — NONE DETECTED
- Monitoring Well
- PZ-1 — Piezometer
- BTEX Contour

DRAWN BY: STE	DATE: APR 97
APPROVED BY: RM	FILE No.: 96095

TABLE 1. GROUND-WATER ELEVATION CALCULATIONS

Jay Peak Maintenance Garage
Jay, VT

Monitoring Date: 12 March 1997

Well I.D.	Top of Casing Elevation	Depth to Product	Depth to Water	Product Thickness	Corrected Depth to water	Water Table Elevation
MW-1	93.42	--	11.22	--	--	82.20
MW-2	95.30	--	5.02	--	--	90.28
MW-3	97.41	--	11.94	--	--	85.47
MW-4	97.92	7.40	8.48	1.08	7.61	89.44
MW-5	99.46	--	3.40	--	--	96.06
MW-6	96.44	--	16.82	--	--	79.62
MW-7	100.00	--	5.42	--	--	94.58
MW-8	97.75		4.14	--	--	93.61
Rec. Well	99.15	--	12.00	--	--	87.15

All values reported in feet relative to an arbitrary datum.

TABLE 2. SUMMARY OF ANALYTICAL RESULTS

Jay Peak Maintenance Garage
Jay, VT

Monitoring Date: 12 March 1997

Well I.D.	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	MTBE
MW-1	3,640	384.0	905.0	3,580	8,412	13,600
MW-2	74.7	169.0	156.0	394.0	794	120.0
MW-3	4,980	6,610	866.0	5,070	17,526	21,700
MW-5	685.0	1,810	409.0	1,920	4,824	1,090
MW-6	2.2	3.7	1.3	5.2	12.4	61.5
MW-7	ND <1	TBQ <1	TBQ <1	2.7	2.7	ND <1
MW-8	34.0	241.0	144.0	589.0	1,008	133.0
Recovery Well	1,040	2,280	61.9	1,500	4,882	3,240
PZ-1	6,060	35,900	7,890	64,700	114,550	4,450
PZ-2	1.7	2.0	ND <1	2.5	6.2	75.3
PZ-3	3.3	1.6	ND <1	4.2	9.1	86.9
Supply Well	ND <1	ND <1	ND <1	ND <1	-	ND <1
VGES*	5	2,420	680	400	-	40

Curtain Drain	6.1	13.9	22.3	77.0	119	29.8
Stream-upgradient	ND <1	ND <1	ND <1	ND <1	ND	ND <1
Stream-midgradient	8.6	26.2	3.4	11.9	50.1	3.0
Stream-downgradient	2.0	5.2	1.1	2.2	10.5	3.2
WQS	1	6,800	3,100	-	-	-

Results reported as micrograms per liter (equivalent to parts per billion, or ppb).

ND = Not detected above indicated detection limit.

VGES = Vermont Groundwater Enforcement Standard, * Vermont Health Advisory for MTBE.

WQS = Vermont Water Quality Standard (Surface Water)

TBQ = Trace Below Quantification

Shaded areas denote exceedance of applicable standard

APPENDIX B

Soil Boring and Well Construction Logs

Ground Water of Vermont

FIELD SUPERVISOR B. Hamida
CONTRACTOR Adams Engineering
DRILLERS J. Adams

JOB LOCATION Jay Peak
DATE 2/10/97

DRILLING METHOD Vibratory
BORING DIAMETER 2.375"

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION (sketch on back or on-site plan with measurements)

BORING # MW-1

TOTAL DEPTH 20'

LENGTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
				1.5	dark brown, med/coarse sand + gravel		dry, no odor 0.6 ppm		
					brown, med sand		1.5 ppm	bent. / riser	5'
				2.5	same		2.1 ppm		
10'					same		sl. moist 2.2 ppm		10'
				3.5	med/coarse sand + gravel dark gray, small cobbles		moist, no odor 2.8 ppm	Sand	
15'					same, dark staining		wet, strong weathered petr. odor, slight sheen 248 ppm		15'
				4.5	med sand		wet 4.5		
					med/coarse sand + gravel		slight petr. odor 32.6		
20'					dark gray soft clay		10.6		20'
25'									25'
30'									30'
35'									35'
40'									40'

GW @ 12' bgs
sheen on bob
Screen 7'-17' bgs
bentonite 1'-6' bgs
sand pack 6'-17'
well developed

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR B. HAMILTON
CONTRACTOR Adams Eng.
DRILLERS J. Adams

JOB LOCATION Jay Peak
DATE 2/10/97

DRILLING METHOD Vibratory
BORING DIAMETER 2.375"

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION (sketch on back or on-site plan with measurements)

BORING # MW-2

TOTAL DEPTH 13' bgs

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
				1.5	brown med. sand		dry, no odor 5.3 ppm		
5'					same		moist, no odor 7.8 ppm		5'
				1.5	same, dark petroleum staining		moist, slight odor 68.4		
10'					med. sand + gravel		wet, slight odor 31.9		10'
				3.5	dark brown loamy coarse sand + gravel		wet, petroleum sheen 18.9		
15'					dark gray, firm clay		wet, slight odor 18.8		15'
20'							Gw @ 6' bgs refusal @ 13' screen 2'-12' bgs sand to 1.5' bgs bentonite 1'-1.5' bgs manway well developed		20'
25'									25'
30'									30'
35'									35'
40'									40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR Adams Eng.
DRILLERS J. Adams

JOB LOCATION Jay Peak
DATE 2/18/97

DRILLING METHOD Vibratory
BORING DIAMETER 2.375"

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION sketch on back or on-site plan with measurements
BORING # MW-3
TOTAL DEPTH 20'

CASING	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
				2.5	dark brown loamy sand		dry, no odor 4.1 ppm		
					same & med sand + gravel		6.8		5'
				2.5	dark brown med. sand + gravel		moist, strong petroleum odor 59.4		
10'					light gray med sand		dry, strong odor 225		10'
				4.5	light gray, fine silty sand		moist strong odor 112.4		
5'							92.9		15'
							103.2		
				3.5	dark brown med. sand + gravel		wet 38.0		
20'					dark gray soft clay		slight odor 9.5		20'
							GW @ 12' bgs screen 7-17' bgs manway well developed Bentonite 1-6' bgs		
25'									25'
30'									30'
35'									35'
40'									40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.010"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR BHAMILA
CONTRACTOR Adams Eng.
DRILLERS J. Adams

JOB LOCATION Jay Peak
DATE 2/11/97

DRILLING METHOD Vibratory
BORING DIAMETER 2.375"

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION
sketch on back or on-site plan with measurements

BORING # MW-4
TOTAL DEPTH 15' bgs

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL
				2.5	light brown med sand		dry, strong gas odor 294 ppm	
					med. sand; black staining wood residue			
5'							same 169.4	
				1.5	coarse sand + gravel		moist 1926	
					same, black staining		wet 1328	
10'				4.5	coarse sand + gravel		1259	
					dark gray, soft clay		97.8	
					same		sl. odor 11.0	
15'								
20'								
25'								
30'								
35'								
40'								

GW @ 8' bgs
Screen 3.1' - 13.1' bgs
manway
bentonite 1-1.5' bgs
well developed
sand 1.5 - 13.1'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.010"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR Adams Eng.
DRILLERS J. Adam

JOB LOCATION Jay Peak
DATE 2/11/97

DRILLING METHOD Vibratory
BORING DIAMETER 2.375"

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION (sketch on back or on-site plan with measurements)

BORING # MW-5
TOTAL DEPTH 15'

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
				0.5	med. sand + gravel		dry — strong gas odor — 929		
5'				4.5	med. sand + gravel coarse gravel dark gray, soft clay dark gray, firm clay		wet — gas odor — 1478 sl. odor — 323 43.9 42.7		5'
10'				5	dark gray, firm clay same med. gravel		no odor — 2.8 3.4 18.9		10'
15'							GW @ 5' bgs screen 3'-13' bentonite 1-1.5' manway well developed		15'
20'									20'
25'									25'
30'									30'
35'									35'
40'									40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR Tri-State Drilling
DRILLERS N. Faulkner

JOB LOCATION Jay Peak
DATE 2/24/97

DRILLING METHOD Split-spoon
BORING DIAMETER

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION sketch on back or on-site plan with measurements

BORING # 6

TOTAL DEPTH 16'

LITH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
				1.0	dark brown sand + gravel		dry, no odor 0.3 ppm		5'
10'–12'				1.0	dark brown med sand		slightly moist, no odor 0.5		10'
15'–17'				1.0	dark brown silty sand		wet, no odor 0.7 ppm refusal At 16' screen 5'–15' Above-grade stickup casing		15'
20'									20'
25'									25'
30'									30'
35'									35'
40'									40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	2" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR Tri-State Drilling
DRILLERS N. Faulkner

JOB LOCATION Jay Peak
DATE 2/24/97

DRILLING METHOD split spoon
BORING DIAMETER

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION sketch on back or on-site plan with measurements

BORING # 7

TOTAL DEPTH 16'

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" 0/6	6/12	12/18	18/24	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION
5'	1						1.0	dark gray, fine silty sand		sl. moist no odor 0.8 ppm
10'	2						1.0	same		wet, no odor 0.7 ppm
15'	7						0.5	same		wet, no odor 0.7 ppm
20'										
25'										
30'										
35'										
40'										

WELL DETAIL

DEPTH: 5', 10', 15', 20', 25', 30', 35', 40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN			GROUT		
SLOT SIZE			BACKFILL		
RISER PIPE			WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR Tri-State Drilling
DRILLERS N. Faulkner

JOB LOCATION Jay Peak
DATE 2/24/97

DRILLING METHOD split spoon
BORING DIAMETER

AND 40 – 50%
SOME 10 – 40%
TRACE 0 – 10%

BORING LOCATION
sketch on back or on-site plan with measurements

BORING # 8
TOTAL DEPTH 16

LOG	SAMPLES	SAMPLE NUMBER	BLOWS PER 6" (0/6, 6/12, 12/18, 18/24)	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
									5'
5'–	7			1.0	dark gray med. sand + gravel		wet, petrol sheen 223 ppm strong gas odor		
10'–	2			2.0	dark gray, firm clay fine silty sand		wet slight odor 63.4 same 18.7		10'
15'–	7			1.0	dark gray sandy clay		wet no odor 9.2 ppm		15'
20'									20'
25'									25'
30'									30'
35'									35'
40'									40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN			GROUT		
SLOT SIZE			BACKFILL		
RISER PIPE			WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

APPENDIX C

Laboratory Report Forms

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: GroundWater of Vermont
PROJECT NAME: Jay Peak Maint. Garage
REPORT DATE: March 24, 1997
DATE SAMPLED: March 12, 1997

PROJECT CODE: GWVT1318
REF.#: 100,788 - 100,804

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Jay Peak Maint. Garage
CLIENT PROJ. #: NI

DATE RECEIVED: March 13, 1997
REPORT DATE: March 24, 1997
PROJECT CODE: GWVT1318

Ref. #:	100,798	100,799	100,800	100,801	100,802
Site:	C2-Effluent	Upstream	Pizeometer #2	Midstream	Downstream
Date Sampled:	3/12/97	3/12/97	3/12/97	3/12/97	3/12/97
Time Sampled:	15:15	15:30	15:50	15:40	15:55
Sampler:	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh
Date Analyzed:	3/20/97	3/20/97	3/20/97	3/20/97	3/20/97
UIP Count:	0	0	7	10	1
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	92	91	90	95	94
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<1	<1	1.7	8.6	2.0
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	3.4	1.1
Toluene	<1	<1	2.0	26.2	5.2
Xylenes	<1	<1	2.5	11.9	2.2
MTBE	<1	<1	75.3	3.0	3.2

Ref. #:	100,803	100,804
Site:	Pizeometer #3	Pizeometer #1
Date Sampled:	3/12/97	3/12/97
Time Sampled:	16:30	17:30
Sampler:	Bruce/Hugh	Bruce/Hugh
Date Analyzed:	3/20/97	3/20/97
UIP Count:	3	>10
Dil. Factor (%):	100	0.2
Surr % Rec. (%):	94	95
Parameter	Conc. (ug/L)	Conc. (ug/L)
Benzene	3.3	6,060.
Chlorobenzene	<1	<500
1,2-Dichlorobenzene	<1	<500
1,3-Dichlorobenzene	<1	<500
1,4-Dichlorobenzene	<1	<500
Ethylbenzene	<1	7,890.
Toluene	1.6	35,900.
Xylenes	4.2	64,700.
MTBE	86.9	4,450.

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Jay Peak Maint. Garage
CLIENT PROJ. #: NI

DATE RECEIVED: March 13, 1997
REPORT DATE: March 24, 1997
PROJECT CODE: GWVT1318

Ref. #:	100,788	100,789	100,790	100,791	100,792
Site:	Trip Blank	MW#6	MW#2	MW#1	MW#3
Date Sampled:	3/12/97	3/12/97	3/12/97	3/12/97	3/12/97
Time Sampled:	12:45	12:48	12:59	12:55	13:05
Sampler:	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh
Date Analyzed:	3/19/97	3/19/97	3/19/97	3/19/97	3/20/97
UIP Count:	0	>10	>10	>10	9
Dil. Factor (%):	100	100	20	0.5	0.2
Surr % Rec. (%):	93	96	86	96	96
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<1	2.2	74.7	3,540.	4,980.
Chlorobenzene	<1	<1	<5	<200	<500
1,2-Dichlorobenzene	<1	<1	<5	<200	<500
1,3-Dichlorobenzene	<1	<1	<5	<200	<500
1,4-Dichlorobenzene	<1	<1	<5	<200	<500
Ethylbenzene	<1	1.3	156.	908.	866.
Toluene	<1	3.7	169.	384.	6,610.
Xylenes	<1	5.2	394.	3,580.	5,070.
MTBE	<1	61.5	120.	13,800.	21,700.

Ref. #:	100,793	100,794	100,795	100,796	100,797
Site:	MW#5	MW#7	MW#8	C1-Effluent	C1-Influent
Date Sampled:	3/12/97	3/12/97	3/12/97	3/12/97	3/12/97
Time Sampled:	13:12	13:10	13:20	15:15	15:15
Sampler:	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh	Bruce/Hugh
Date Analyzed:	3/20/97	3/20/97	3/20/97	3/20/97	3/20/97
UIP Count:	>10	6	>10	0	>10
Dil. Factor (%):	2	100	5	10	2
Surr % Rec. (%):	96	96	92	95	100
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	685.	<1	34.0	<10	1,040.
Chlorobenzene	<50	<1	<20	<10	<50
1,2-Dichlorobenzene	<50	<1	<20	<10	<50
1,3-Dichlorobenzene	<50	<1	<20	<10	<50
1,4-Dichlorobenzene	<50	<1	<20	<10	<50
Ethylbenzene	409.	TBQ <1	144.	<10	61.9
Toluene	1,810.	TBQ <1	241.	10.0	2,280.
Xylenes	1,920.	2.7	589.	13.0	1,500.
MTBE	1,090.	<1	133.	735.	3,240.

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated

ENDYNE, INC.

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

20194

CHAIN-OF-CUSTODY RECORD

Project Name: JAY PEAK Maint. Garage Site Location: JAY PEAK	Reporting Address: 1 Mill St. Box C-5 Burlington, VT 05401	Billing Address: 1 Mill St Box C-5 Burlington, VT 05401
Endyne Project Number: GWVT1318	Company: G.W.V. Contact Name/Phone #: Bruce Hamilton 860-6065	Sampler Name: Bruce + Hugh. Phone #: 860-6065.

Lab #	Sample Location	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
100,788	Trip Blank	H_2O	X		3/12 12:45 P	2	40ml		30	HCl	
100,789	MW #6	H_2O	X		3/12 12:48 P	2	40ml		30	HCl	
100,790	MW #2	H_2O	X		3/12 12:59	2	40ml		30	HCl	
100,791	MW #1	H_2O	X		3/12 12:55	2	40ml		30	HCl	
100,792	MW #3	H_2O	X		3/12 1:05	2	40 ml		30	HCl	
100,793	MW #5	H_2O	X		3/12 1:12 P	2	40 ml		30	HCl	
100,794	MW #7	H_2O	X		3/12 1:10 P	2	40 ml		30	HCl	
100,795	MW #8	H_2O	X		3/12 1:28 P	2	40 ml		30	HCl	
100,796	C_1 - Effluent	H_2O	X		3/12 3:15 P	2	40ml		30	HCl	
100,797	C_1 - Influent	H_2O	X		3/12 3:15 P	2	40 ml		30	HCl	
100,798	C_2 - Effluent	H_2O	X		3/12 3:15 P	2	40 ml		30	HCl	
100,799	UPStream	H_2O	X		3/12 3:30 P	2	40 ml		30	HCl	

Relinquished by: Signature Hugh Rowe	Received by: Signature [illegible]	Date/Time 3/13/97 9:20
Relinquished by: Signature	Received by: Signature John Sullivan	Date/Time 3/13/97 1:30 pm

New York State Project: Yes ____ No X

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD_5	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify): 8020 + MTBE										

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Marin Environmental
PROJECT NAME: Jay Peak
REPORT DATE: May 30, 1997
DATE SAMPLED: May 23, 1997

PROJECT CODE: GWVT1413
REF.#: 104,446

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Marin Environmental
PROJECT NAME: Jay Peak
CLIENT PROJ. #: V96095

DATE RECEIVED: May 29, 1997
REPORT DATE: May 30, 1997
PROJECT CODE: GWVT1413

Ref. #:	104,446				
Site:	Curtain Drain				
Date Sampled:	5/23/97				
Time Sampled:	16:31				
Sampler:	R. Miller				
Date Analyzed:	5/29/97				
UIP Count:	>10				
Dil. Factor (%):	100				
Surr % Rec. (%):	87				
Parameter	Conc. (ug/L)				
Benzene	6.1				
Chlorobenzene	<1				
1,2-Dichlorobenzene	<1				
1,3-Dichlorobenzene	<1				
1,4-Dichlorobenzene	<1				
Ethylbenzene	22.3				
Toluene	13.9				
Xylenes	77.0				
MTBE	29.8				

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated

ENDYNE, INC.

09965

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

V96095

CHAIN-OF-CUSTODY RECORD

Project Name: Jay Peak Site Location:	Reporting Address: 1700 Hegeman Ave Colchester, VT 05446	Billing Address:
Endyne Project Number:	Company: Marin Environmental Contact Name/Phone #: 655-0011	Sampler Name: R Miller Phone #:

Lab #	Sample Location	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
	CurtainDrain	H_2O	X		5/23/17 1631	2	40cc	0.1-r	30	HCl	

Relinquished by: Signature [signature] Received by: Signature [signature] Date/Time 5-27-17 1110

Relinquished by: Signature [signature] Received by: Signature [signature] Date/Time 5-23-17 2100

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD_5	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify): 8020+MTBE										